

ABSTRACT OF THE DISCLOSURE

- A reservoir simulator first estimates rock displacement parameters (u, v, and w) representing rock movement in the x, y, and z directions. When the rock displacement parameters (u, v, w) are determined, " $\epsilon_{x,y,z}$ " (the 'x,y,z elongation strains') and " $\gamma_{xy,yz,zx}$ " (the 'shear strains') are determined since " $\epsilon_{x,y,z}$ " and " $\gamma_{xy,yz,zx}$ " are function of "u", "v", and "w". When " $\epsilon_{x,y,z}$ " and " $\gamma_{xy,yz,zx}$ " are determined, " $\sigma_{x,y,z}$ " (the 'elastic normal rock stress in x,y,z directions') and " $\tau_{xy,yz,zx}$ " (the 'elastic shear stress') are determined since
- 10 " $\sigma_{x,y,z}$ " and " $\tau_{xy,yz,zx}$ " are a function of " $\epsilon_{x,y,z}$ " and " $\gamma_{xy,yz,zx}$ ". When " $\sigma_{x,y,z}$ " and " $\tau_{xy,yz,zx}$ " are determined, the rock momentum balance differential equations can be solved, since these equations are a function of " $\sigma_{x,y,z}$ " and " $\tau_{xy,yz,zx}$ ". When any residuals are substantially equal to zero, the estimated rock displacement parameters (u, v, and w) will represent 'accurate rock displacement parameters' for the reservoir.
- 15 When the rock momentum balance differential equations are solved, the rock displacement parameters (u, v, w), at an advanced time, are known. These rock displacement parameters (u, v, w) represent and characterize a 'subsidence' in a seabed floor because subsidence will result from rock movement; and rock movement will result from a continual withdrawal of oil or other hydrocarbon deposits or other fluids such as
- 20 water over a period of time from an Earth formation. This 'abstract of the disclosure' is given for the sole purpose of allowing a patent searcher to easily determine the content of the disclosure in this application.